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(71)出願人　000005049
シャープ株式会社
大阪府大阪市阿倍野区長池町22番22号
(72)発明者　疋田　富士夫
大阪府大阪市阿倍野区長池町22番22号　シャープ株式会社内
(74)代理人　100079843
弁理士　高野　明近

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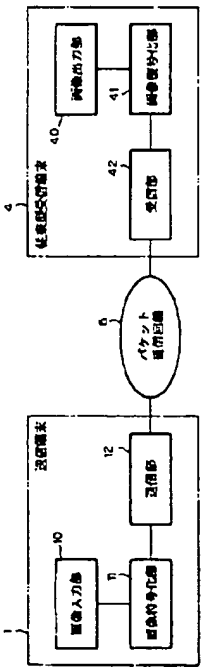
(54)【発明の名称】　マルチメディア通信装置

(57)【要約】
【目的】　パケット通信回線を用いて高精細な画像または音声を確実に送信並びに受信する。
【構成】　送信側からはＵＤＰプロトコルでの伝送と並行して、信頼性のあるＴＣＰプロトコルでの伝送を行い、画像または音声情報を送信する。受信側は、ＵＤＰプロトコルのパケット欠落を監視する機能を持っており、送信側へ欠落情報を送信する。さらに、ＵＤＰプロトコルとＴＣＰプロトコルのいずれかで画像あるいは音声情報を受信でき、送信側が同時に２つのプロトコルで伝送した情報を選択して受信することができる。パケットの欠落が発生した場合には、送信側と受信側の間でＵＤＰプロトコルを使用して伝送していた画像または音声情報を、ＴＣＰプロトコルに切り替えて伝送を行い、ＴＣＰプロトコルの再送機能により確実な伝送が行われる。



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【特許請求の範囲】

【請求項1】 画像情報あるいは音声情報等のマルチメディア情報をパケットベース通信を行うマルチメディア通信装置において、相手端末に送信する機能として、RTPパケットを作成する手段と、RTPパケットよりUDPパケットを作成する手段と、RTPパケットよりTCPパケットを作成する手段と、UDPパケットあるいはTCPパケットを通信回線に送出する手段と、相手端末より到来するパケット欠落情報を受信する手段を有し、また相手端末から受信する機能として、パケット通信回線より相手端末より送られてきたUDPパケットあるいはTCPパケットを受信する手段と、UDPパケットよりRTPパケットを抽出する手段と、TCPパケットよりRTPパケットを抽出する手段と、前記抽出されたRTPパケットよりマルチメディア情報を抽出する手段と、UDPパケットの欠落数を計数する手段と、計数されたUDPパケットの欠落数をパケット欠落情報として相手端末へ送信する手段を有し、パケット通信回線を介して、相互にマルチメディア情報を通信することを特徴とするマルチメディア通信装置.

【請求項2】 相手端末より到来したパケット欠落情報により、UDPパケットによるマルチメディア情報の送信と並行して、TCPパケットによる送信を行うことを特徴とする請求項1に記載のマルチメディア通信装置.

【請求項3】 相手端末より同一の画像情報あるいは音声情報等のマルチメディア情報を乗せたUDPパケットあるいはTCPパケットのうち、いずれかを選択して受信する手段を有し、パケット欠落情報から受信するパケットを決定し、マルチメディア情報を受信することを特徴とする請求項1または2に記載のマルチメディア通信装置.

【請求項4】 請求項1乃至3のいずれかに記載のマルチメディア通信装置として、コンピュータを機能させるためのプログラムを記録した、コンピュータで読み取り可能な記録媒体.

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、LAN等のネットワーク上で動作するパーソナルコンピュータ，携帯情報端末等の情報処理装置で実行されるアプリケーション間通信に関し、特にパケットベースのプロトコル（TCP（UDP）／IP）を使用してパケット通信を行うマルチメディア通信装置に関する.

【0002】

【従来の技術】従来、画像，音声あるいはこれらの同時通信をパケット通信回線を用いて行う場合、国際標準ITU-TH．323に準拠した通信を行う場合、通信プロトコルRTP（A Transport Protocol for Real-Time Applications）並びにUDPを利用した通信を行う。以下、図7を参照しながら画像伝送を行う場合について

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説明する.

【0003】まず、送信端末3では、画像入力部30より伝送する画像を取り込む．取り込まれた画像信号を画像符号化部31にて、通信に適当な圧縮・符号化等を行った情報に変換する．この変換された情報は、送信部32へ渡される．送信部32では、まず、RTPパケット組立部321において、RTPプロトコルを使用して受信端末4へ画像情報を伝送するために、画像情報に必要なヘッダ等の情報を付与してRTPパケットを生成する．生成されたRTPパケットは、UDPパケット組立部322にて、ヘッダ等の情報を付与してUDPパケットを生成する．生成されたUDPパケットは、パケット送信部323よりパケット通信回線5に送出される.

【0004】受信端末4では、パケット通信回線5より到達したパケットを受信部43にて受け取る．受信部内では、まず、パケット受信部433が通信回線よりパケットを受信する．次に、UDPパケット分解部432に受信したUDPパケットを渡し、UDPパケット内よりRTPパケットを抽出する．抽出されたRTPパケットは、RTPパケット分解部431において、画像情報のみを取り出す．この情報を画像復号化部42にて、符号化・圧縮からの復元を行い、画像出力部41より画像信号が取り出される．以上のように、伝送する画像情報をRTPパケット上に乗せ、さらにRTPパケットをUDPパケット上に乗せて、パケット通信回線上での伝送が行われる.

【0005】ここで、UDP（User Datagram Protocol）は、信頼性よりも高速伝送を重視しているプロトコルである．図5に、1からn個のUDPパケットを伝送する際の伝送手順を示す．図5のように、UDPではパケットを相手端末に送りつけるのみで、再送など他の処理をしないためスループットの高い伝送が行える．しかし、送信するパケットが誤った場合でもパケットの再送は行われない．このように、UDPは信頼性はないが高速なデータの伝送が行えるといった利点があり、動画像データのようなリアルタイム性が要求されるデータの伝送に向いているため、従来方式では、画像並びに音声符号化データの伝送にはUDPが使用されている.

【0006】この信頼性の低さを改善するために、特開平10-56479号公報においては、UDPパケットのユーザデータ領域内にパケットの連続番号を付与し、受信端末側で連続番号の不連続を検出すると、送信端末に対して欠落情報を通知し、送信端末側に再送を要求する方法を採用している．この方法では、UDPプロトコルの上位プロトコルは、同公報に記載されている独自のプロトコルを実装し、これを実現する必要がある.

【0007】

【発明が解決しようとする課題】パケット通信回線上では、回線内での輻輳、また回線内の無線区間においては伝送誤りの発生等が原因でパケットの欠落が生じる．従

来の技術では、画像並びに音声をＵＤＰパケット化し、これを相手に送信する。前記の通り、ＵＤＰは通信に関しては非保障であり、俗にいう「送りっぱなし」な通信プロトコルである。仮にパケットが損失する環境でユーザが「多少伝送に時間がかかっても良いから、正確に画像を送信したい」という要望があったとしても実現することができない。また、上記公報における実現方法も、通常ＩＴＵ－Ｔ勧告Ｈ．３２３に準拠した画像あるいは音声通信を行う場合は、ＵＤＰプロトコルの上位プロトコルにはＲＴＰプロトコルを使用しており、ＲＴＰプロトコルの代わりに同公報で示されたプロトコルを採用すると、それぞれの端末間で相互の接続が保障されなくなる。

【０００８】

【課題を解決するための手段】上記の課題を解決するために本発明では、パケット欠落が発生した際、送信側からはＵＤＰプロトコルでの伝送と並行して、信頼性のあるＴＣＰプロトコルでの伝送を行い、画像または音声を送信する。受信側ではＵＤＰかＴＣＰのどちらかで受信する。ここでＴＣＰ（Transmission Control Protocol）とは、信頼性の高い通信を可能にするプロトコルであり、受信側はパケットを受信するたびにＡＣＫを送信側へ送り返し、送信側ではＡＣＫが送られてくるのを待って次のパケットを送信する。仮に受信側で受信パケットに誤りがあった場合には、ＮＡＣＫが送り返され再送が行われる。図６に、１からｎ個のＴＣＰパケットを伝送する際の伝送手順を示す。図６のように、ＴＣＰではデータの伝送は保障されるが、ＵＤＰよりデータの伝送に必要な手順が複雑になるため、リアルタイム性が要求されるデータの伝送には比較的不向きとなる。また、受信側では、ＵＤＰプロトコルのパケット欠落を監視する機能を持たせて、送信側へ欠落情報を送信できるようにする。さらに、ＵＤＰプロトコルとＴＣＰプロトコルのいずれかで画像あるいは音声情報を受信できるようにすることで、送信側が同時に２つのプロトコルで伝送した情報を選択して受信することが可能となる。

【０００９】請求項１の発明は、画像情報あるいは音声情報等のマルチメディア情報をパケットベース通信を行うマルチメディア通信装置において、相手端末に送信する機能として、ＲＴＰパケットを作成する手段と、ＲＴＰパケットよりＵＤＰパケットを作成する手段と、ＲＴＰパケットよりＴＣＰパケットを作成する手段と、ＵＤＰパケットあるいはＴＣＰパケットを通信回線に送出する手段と、相手端末より到来するパケット欠落情報を受信する手段を有し、また相手端末から受信する機能として、パケット通信回線より相手端末より送られてきたＵＤＰパケットあるいはＴＣＰパケットを受信する手段と、ＵＤＰパケットよりＲＴＰパケットを抽出する手段と、ＴＣＰパケットよりＲＴＰパケットを抽出する手段と、前記抽出されたＲＴＰパケットよりマルチメディア情報を抽出する手段と、ＵＤＰパケットの欠落数を計数する手段と、計数されたＵＤＰパケットの欠落数をパケット欠落情報として相手端末へ送信する手段を有し、パケット通信回線を介して、相互にマルチメディア情報を通信するようにしたものである。

【００１０】請求項２の発明は、請求項１の発明において、相手端末より到来したパケット欠落情報により、ＵＤＰパケットによるマルチメディア情報の送信と並行して、ＴＣＰパケットによる送信を行うようにしたものである。

【００１１】請求項３の発明は、請求項１または２の発明において、相手端末より同一の画像情報あるいは音声情報等のマルチメディア情報を乗せたＵＤＰパケットあるいはＴＣＰパケットのうち、いずれかを選択して受信する手段を設け、パケット欠落情報から受信するパケットを決定し、マルチメディア情報を受信するようにしたものである。

【００１２】請求項４の発明は、請求項１乃至３のいずれかに記載のマルチメディア通信装置として、コンピュータを機能させるためのプログラムを記録した、コンピュータで読み取り可能な記録媒体に関する。

【００１３】

【発明の実施の形態】本発明のマルチメディア通信装置によれば、受信側で同一のデータを受信することが可能となるため、画像あるいは音声情報を正確に受信したい場合には、ＴＣＰプロトコルで運ばれた画像あるいは音声情報を受信し、パケットの欠落が発生した場合には、再送手段により受信端末側は確実に画像あるいは音声情報を受信することが可能となる。また、ＩＴＵ－ＴＨ．３２３に準拠した端末への画像あるいは音声情報の伝送は、送信側がＵＤＰ／ＴＣＰの両方で画像あるいは音声情報を送信しているため、ＵＤＰプロトコルで運ばれた情報を受信すればよく、相互接続性も確保できる。

【００１４】本発明の実施例の構成を説明する。図１は、本発明の一実施例の通信接続形態を示す図である。図２は、本発明の送信端末内送信部の一実施例のブロック構成図である。図３は、本発明の受信端末内受信部の一実施例のブロック構成図である。本発明の実施例では、送信端末１から入力された画像をパケット通信回線５を経由して、受信端末２へ伝送する場合を示す。以下に本発明の実施例の動作について説明する。

【００１５】まず、画像入力部１０より伝送する画像を取り込む。取り込まれた画像信号を画像符号化部１１にて通信に適当な圧縮・符号化等を行った情報に変換する。この変換された情報は、送信部１２へ渡される。送信部１２では、まず、ＲＴＰパケット組立部１２１において、ＲＴＰプロトコルを使用して、受信端末側へ画像情報を伝送するために、画像情報に必要なヘッダ等の情報を付与して、ＲＴＰパケットを生成する。生成されたＲＴＰパケットは、ＵＤＰパケット組立部１２２にて、

ヘッダ等の情報を付与してUDPパケットを生成する．生成されたUDPパケットは、パケット送信部124よりパケット通信回線に送出される。

【0016】受信端末2では、パケット通信回線5より到達したパケットを受信部22にて受け取る．受信部22内では、まず、パケット受信部221が通信回線よりパケットを受信する．次に、UDPパケット分解部222に受信したUDPパケットを渡し、UDPパケット内よりRTPパケットを抽出する．抽出されたRTPパケットは、RTPパケット分解部224において、画像情報のみを取り出す。なお、通信開始時はUDPパケットにより画像情報が伝送されてくるため、SW228はb側に倒してある．取り出された情報は画像復号化部21にて、符号化・圧縮からの復元を行い画像出力部20より画像信号が取り出される。

【0017】ところが、受信端末側にて送信端末より送信されたパケットが受信できない場合、UDPパケット分解部222において検出し、受信できなかったパケット数をカウンタ227にて計数する．ここで、パケットが受信できなかったことを検出する方法は、UDPパケットのヘッダ内にパケットの連続番号が付与されており、この番号をパケット受信毎に確認し、番号の不連続が検出できた時点で受信できなかったパケットが存在することを検出することができる．伝送制御部226では、このカウンタを常時監視し、ある一定間隔でカウンタの値を欠落パケット数として欠落情報送信部225に通知し、欠落情報送信部では、適当なタイミングで欠落情報を送信端末側に送出する．一方、送信端末では、受信端末より伝送された欠落情報を欠落情報受信部125にて受信すると、受信内容を伝送制御部126に通知する．このようにして、両端末がパケットの欠落を知ることができる．なお、欠落情報の通知手段は、RTP制御プロトコル（RTCP）を使用して実現することができる．

【0018】そこで、通信を開始する時点で、パケットの欠落数の閾値を互いの端末間であらかじめ決定しておき、受信端末側でパケット欠落が閾値を越えた時点でSW228をb側からa側へ切り替えることにより、送信端末からTCPパケットに乗せられて到来したRTPパケットを受信することができる．以降、パケット受信部221で受信したパケットをTCPパケット分解部223へ送り、ヘッダ等を除去した後、SW228を経由してRTPパケット分解部224へ抽出されたRTPパケットを引き渡す．一方、送信端末の側では、受信端末より通知されたパケット欠落が閾値を越えたことを伝送制御部126にて認識すると、SW127を閉じて1つのRTPパケットをUDPパケットとTCPパケットの2種類のパケットを使用して、受信端末側に送信する。

【0019】これにより、送信端末と受信端末の間でUDPプロトコルを使用して伝送していた画像情報を、TCPプロトコルに切り替えて伝送を行うことが可能となり、TCPプロトコルの再送機能による確実な伝送が行われる．なお、受信端末側でパケット欠落の閾値を越えた時点で、この時点以降もパケット欠落等が発生しても、再送によるスループットの低下を避けて通信を継続したい場合には、SWをb側のままとしてUDPプロトコルによる伝送を継続させることも可能である。また、受信端末側が、本発明にて示したUDP／TCPパケット受信の切り替えを行えない従来型受信端末4である場合の接続図を図4に示す．この接続の場合には、パケットの欠落が発生しても、受信端末4から送信端末1へパケット欠落情報が通知されないため、UDPプロトコルによる通信を使用した伝送を行うことが可能である。

【0020】

【発明の効果】本発明装置を使用した通信では、高精細な画像または音声を送信並びに受信することができる．また、画像あるいは音声情報をUDPパケットでも送信するので、相手が国際標準準拠の端末であっても、問題なく通信できる。

【図面の簡単な説明】

【図1】　本発明の一実施例の通信接続形態を表すブロック図である。

【図2】　本発明の送信部の一実施例を表すブロック構成図である。

【図3】　本発明の受信部の一実施例を表すブロック構成図である。

【図4】　本発明の他の実施例である従来型受信端末との通信接続形態を表すブロック構成図である。

【図5】　UDPを用いた端末間通信を表すシーケンス図である。

【図6】　TCPを用いた端末間通信を表すシーケンス図である。

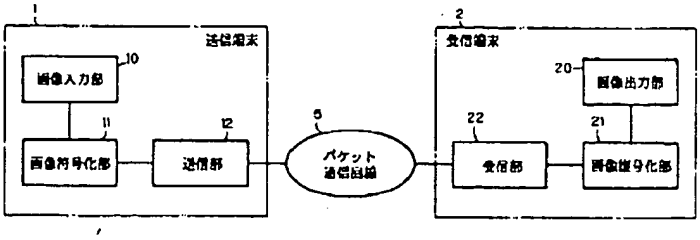
【図7】　従来のパケットによる画像通信を表すブロック図である。

【符号の説明】

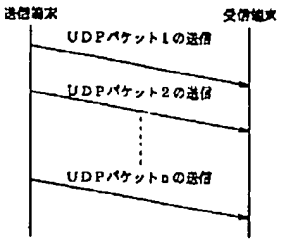
1…送信端末、2…受信端末、3…従来型送信端末、4…従来型受信端末、5…パケット通信回線、10…画像入力部、11…画像符号化部、12…送信部、20…画像出力部、21…画像復号化部、22…受信部、30…画像入力部、31…画像符号化部、32…送信部、41…画像出力部、42…画像復号化部、43…受信部、121…RTPパケット組立部、122…UDPパケット組立部、123…TCPパケット組立部、124…パケット送信部、125…欠落情報受信部、126…伝送制御部、127…SW、221…パケット受信部、222…UDPパケット分解部、223…TCPパケット分解部、224…RTPパケット分解部、225…欠落情報送信部、226…伝送制御部、227…カウンタ、228…SW、321…RTPパケット組立部、322…UDPパケット組立部、323…パケット送信部、431

…RTPパケット分解部、432…UDPパケット分解　　部、433…パケット受信部。

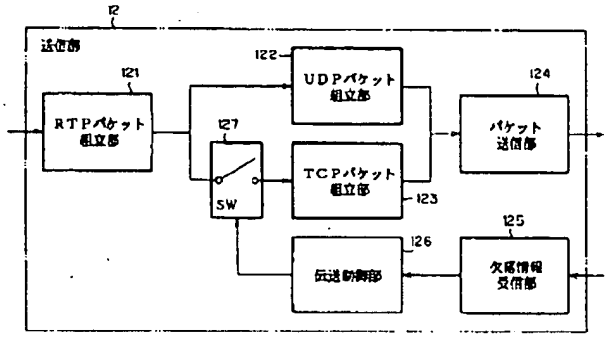
【図1】



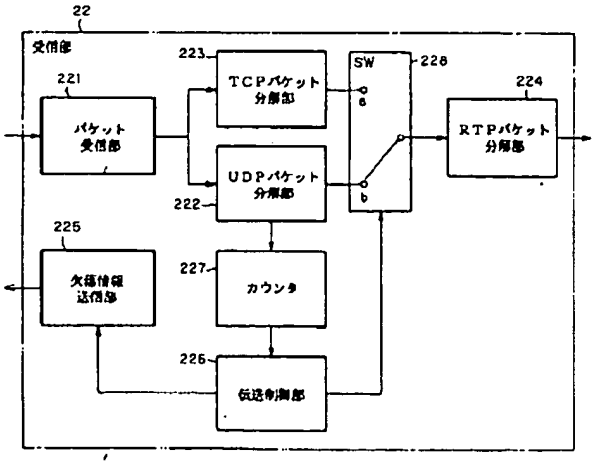
【図5】



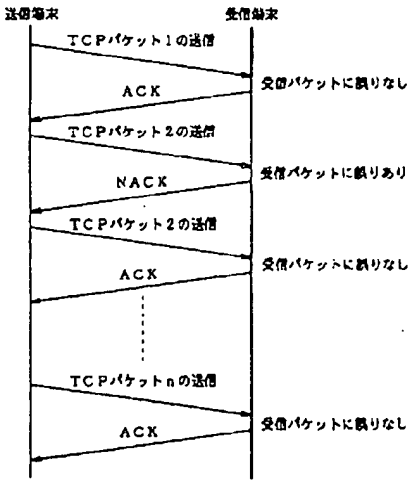
【図2】



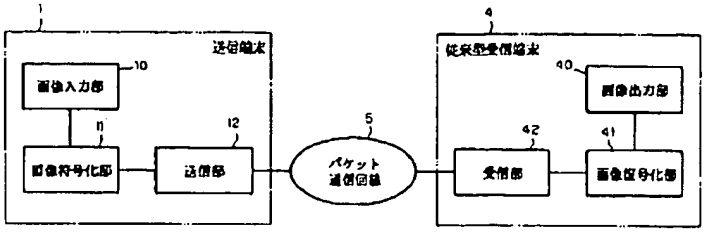
【図3】



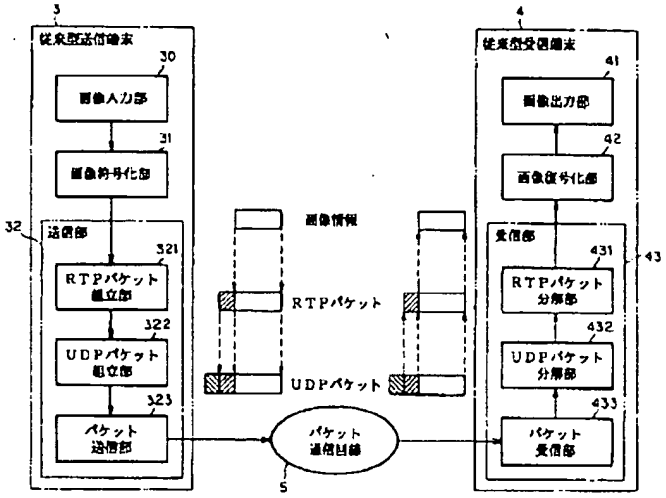
【図6】



【図4】


1
送信端末
10
画像入力部
11
画像符号化部
12
送信部
5
パケット
通信回線
4
従来型受信端末
40
画像出力部
42
受信部
41
画像復号化部

【図7】


3
従来型送信端末
30
画像入力部
31
画像符号化部
32
送信部
321
RTPパケット
組立部
322
UDPパケット
組立部
323
パケット
送信部
5
パケット
通信回線
画像情報
RTPパケット
UDPパケット
4
従来型受信端末
41
画像出力部
42
画像復号化部
43
受信部
431
RTPパケット
分解部
432
UDPパケット
分解部
433
パケット
受信部

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : SHARP CORP

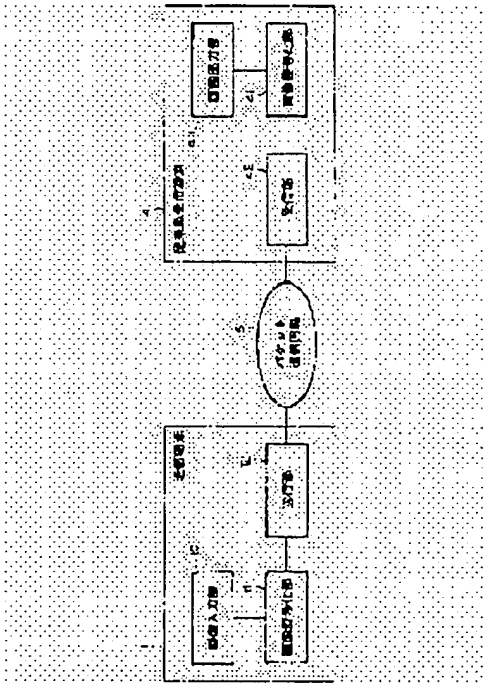
(72)Inventor : HIKITA FUJIO

(54) MULTIMEDIA COMMUNICATION DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To transmit and receive high-definition images or sound by performing transmission with a reliable TCP protocol parallelly with transmission with a UDP protocol from a transmitting side when a packet absence occurs.

SOLUTION: When a receiving terminal 2 side can not receive a packet transmitted from a transmitting terminal 1, a UDP packet decomposing part detects it and a counter counts packets that can not be received. The transmission controlling part of the receiving terminal 2 monitors the counter all the times and notifies an absence information transmitting part of counter value as the number of absence packets at a certain fixed interval, and the absence information transmitting part transmits absence information to the transmitting terminal 1 side at appropriate timing. When the transmission controlling part recognizes that packet absence notified from the terminals 2 exceeds threshold, the transmitting terminal 1 side closes a SW, uses one RTP packet for two kinds of packets being a UDP packet and a TCP packet and transmits to the terminal 2 side.



LEGAL STATUS

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[Date of registration]	09.05.2003
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[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

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CLAIMS

[Claim(s)]
[Claim 1] In the multimedia communication equipment which performs a packet base communication link for multimedia information, such as image information or speech information A means to create a RTP packet as a function transmitted to a partner terminal, A means to create an UDP packet from a RTP packet, and a means to create a TCP packet from a RTP packet, A means to send out an UDP packet or a TCP packet to a communication line, As a function which has a means to receive the packet lack information which comes from a partner terminal, and is received from a partner terminal A means to receive the UDP packet or TCP packet sent from the partner terminal from a packet communication line, A means to extract a RTP packet from an UDP packet, and a means to extract a RTP packet from a TCP packet, A means to extract multimedia information from said extracted RTP packet, Multimedia communication equipment characterized by having the means which carries out counting of the number of lack of an UDP packet, and a means to transmit to a partner terminal by making into packet lack information the number of lack of the UDP packet by which counting was carried out, and communicating multimedia information mutually through a packet communication line.
[Claim 2] Multimedia communication equipment according to claim 1 characterized by performing transmission by the TCP packet in parallel to transmission of the multimedia information by the UDP packet using the packet lack information which came from the partner terminal.
[Claim 3] Multimedia communication equipment according to claim 1 or 2 characterized by having a means to choose either from a partner terminal among the UDP packet which put multimedia information, such as the same image information or speech information, or a TCP packet, and to receive, determining the packet which receives from packet lack information, and receiving multimedia information.
[Claim 4] The record medium which recorded the program for operating a computer as multimedia communication equipment according to claim 1 to 3 and in which reading in a computer is possible.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the multimedia communication equipment which performs packet communication especially using the protocol (TCP (UDP)/IP) of the packet base about the communication link between applications performed with information processors which operate on networks, such as LAN, such as a personal computer and a Personal Digital Assistant.
[0002]
[Description of the Prior Art] When performing the communication link based on international-standards ITU-TH.323 when an image, voice, or these broadcasts were conventionally performed using a packet communication line, the communication link which used UDP for the communications protocol RTP (A Transport Protocol for Real-Time Applications) list is performed. Hereafter, the case where picture transmission is performed is explained, referring to drawing 7 .
[0003] First, in a transmit terminal 3, the image transmitted from the image input section 30 is captured. The incorporated picture signal is changed into the information which performed suitable compression, coding, etc. for a communication link in the image coding section 31. This changed information is passed to the transmitting section 32. In the transmitting section 32, first, in order to transmit image information to an accepting station 4 in RTP packet group Tatebe 321 using a RTP protocol, information, such as a header required for image information, is given, and a RTP packet is generated. By UDP packet group Tatebe 322, the generated RTP packet gives information, such as a header, and generates an UDP packet. The generated UDP packet is sent out to the packet communication line 5 from the packet transmitting section 323.
[0004] In an accepting station 4, the packet which reached from the packet communication line 5 is received in a receive section 43. In the receiving department, the packet receive section 433 receives a packet from a communication line first. Next, a RTP packet is extracted for the UDP packet which received in the UDP packet disassembly section 432 from the inside of delivery and an UDP packet. The extracted RTP packet takes out only image information in the RTP packet disassembly section 431. In this information, in the image decryption section 42, restoration from coding and compression is performed and a picture signal is taken out from the image output section 41. As mentioned above, the image information to transmit is put on a RTP packet, a RTP packet is further put on an UDP packet, and transmission on a packet communication line is performed.
[0005] Here, UDP (User Datagram Protocol) is a protocol which is attaching greater importance than to dependability to high-speed transmission. The transmission protocol at the time of transmitting one to n UDP packets to drawing 5 is shown. Like drawing 5 , by UDP, since other processings, such as resending, are not carried out only by sending a packet to a partner terminal, high transmission of a throughput can be performed. However, resending of a packet is not performed even when the packet which transmits is mistaken. Thus, UDP has the advantage that high-speed data can be transmitted, although it is unreliable, and since it is fit for transmission of the data with which real time nature like dynamic-image data is demanded, by the conventional method, UDP is used for the image list by

transmission of voice coded data.
[0006] If the consecutive number of a packet is given in the user data area of an UDP packet and the discontinuity of the consecutive number is detected by the accepting-station side in JP,10-56479,A in order to improve the lowness of this dependability, lack information would be notified to the transmit terminal and the approach of requiring resending of a transmit-terminal side will be adopted. By this approach, the higher-level protocol of an UDP protocol needs to mount the original protocol indicated by this official report, and needs to realize this.
[0007]
[Problem(s) to be Solved by the Invention] On a packet communication line, lack of a packet arises in the congestion within a circuit, and the wireless section in a circuit owing to generating of a transmission error etc. In a Prior art, voice is formed into an UDP packet in an image list, and it transmits against this. UDP is "a communications protocol without ********" which does not secure about a communication link and is said commonly as aforementioned. It is unrealizable even if there is a request [user] of "wanting to transmit an image correctly since transmission may take time amount somewhat" in the environment which a packet loses. Moreover, when performing the image or voice communication to which the implementation approach in the above-mentioned official report was also usually based on ITU-T recommendation H.323, the RTP protocol is used for the higher-level protocol of an UDP protocol, and if the protocol shown in this official report instead of the RTP protocol is adopted, connection mutual between each terminal is no longer secured.
[0008]
[Means for Solving the Problem] By this invention, in order to solve the above-mentioned technical problem, when packet lack occurs, from a transmitting side, transmission with a reliable TCP protocol is performed in parallel to transmission with an UDP protocol, and an image or voice is transmitted. At a receiving side, it receives by either UDP or TCP. TCP (Transmission Control Protocol) is a protocol which enables a reliable communication link here, and whenever a receiving side receives a packet, it returns ACK to a transmitting side, by the transmitting side, it waits to send ACK and transmits the following packet. When an error is in a receive packet by the receiving side temporarily, NACK is returned and resending is performed. The transmission protocol at the time of transmitting one to n TCP packets to drawing 6 is shown. Like drawing 6 , by TCP, although transmission of data is secured, since a procedure more nearly required for transmission of data than UDP becomes complicated, it becomes comparatively unsuitable for transmission of the data with which real time nature is demanded. Moreover, the function which supervises packet lack of an UDP protocol is given, and it enables it to transmit lack information to a transmitting side in a receiving side. Furthermore, it enables it for a transmitting side to choose the information transmitted to coincidence with two protocols, and to receive by enabling it to receive an image or speech information, with an UDP protocol or a TCP protocol.
[0009] In the multimedia communication equipment with which invention of claim 1 performs a packet base communication link for multimedia information, such as image information or speech information. A means to create a RTP packet as a function transmitted to a partner terminal, A means to create an UDP packet from a RTP packet, and a means to create a TCP packet from a RTP packet, A means to send out an UDP packet or a TCP packet to a communication line, As a function which has a means to receive the packet lack information which comes from a partner terminal, and is received from a partner terminal A means to receive the UDP packet or TCP packet sent from the partner terminal from a packet communication line, A means to extract a RTP packet from an UDP packet, and a means to extract a RTP packet from a TCP packet, A means to extract multimedia information from said extracted RTP packet, It has the means which carries out counting of the number of lack of an UDP packet, and a means to transmit to a partner terminal by making into packet lack information the number of lack of the UDP packet by which counting was carried out, and multimedia information is made to communicate mutually through a packet communication line.
[0010] Invention of claim 2 is made to perform transmission by the TCP packet using the packet lack information which came from the partner terminal in parallel to transmission of the multimedia information by the UDP packet in invention of claim 1.

[0011] In invention of claims 1 or 2, invention of claim 3 establishes a means to choose either among the UDP packet which put multimedia information, such as the same image information or speech information, from the partner terminal, or a TCP packet, and to receive, determines the packet which receives from packet lack information, and receives multimedia information.
[0012] Invention of claim 4 relates to the record medium which can be read by computer which recorded the program for operating a computer as multimedia communication equipment according to claim 1 to 3.
[0013]
[Embodiment of the Invention] Since it becomes possible to receive the same data by the receiving side according to the multimedia communication equipment of this invention, when the image or speech information carried with the TCP protocol to receive an image or speech information correctly is received and lack of a packet occurs, it enables an accepting-station side to receive an image or speech information certainly with a resending means. Moreover, since the transmitting side has transmitted an image or speech information by both UDP/TCP, the image to the terminal based on ITU-TH.323 or transmission of speech information can also secure interconnectivity that what is necessary is just to receive the information carried with the UDP protocol.
[0014] The configuration of the example of this invention is explained. Drawing 1 is drawing showing the communication link topology of one example of this invention. Drawing 2 is the block block diagram of one example of the transmitting section in a transmit terminal of this invention. Drawing 3 is the block block diagram of one example of the receive section in an accepting station of this invention. The example of this invention shows the case where the image inputted from the transmit terminal 1 is transmitted to an accepting station 2 via the packet communication line 5. Actuation of the example of this invention is explained below.
[0015] First, the image transmitted from the image input section 10 is captured. The incorporated picture signal is changed into the information which performed compression, coding, etc. suitable in the image coding section 11 for a communication link. This changed information is passed to the transmitting section 12. In the transmitting section 12, in order to use a RTP protocol and to transmit image information to an accepting-station side in RTP packet group Tatebe 121 first, information, such as a header required for image information, is given, and a RTP packet is generated. By UDP packet group Tatebe 122, the generated RTP packet gives information, such as a header, and generates an UDP packet. The generated UDP packet is sent out to a packet communication line from the packet transmitting section 124.
[0016] In an accepting station 2, the packet which reached from the packet communication line 5 is received in a receive section 22. In a receive section 22, the packet receive section 221 receives a packet from a communication line first. Next, a RTP packet is extracted for the UDP packet which received in the UDP packet disassembly section 222 from the inside of delivery and an UDP packet. The extracted RTP packet takes out only image information in the RTP packet disassembly section 224. In addition, since image information is transmitted by the UDP packet at the time of communication link initiation, SW228 has been moved to the b position. In the image decryption section 21, the taken-out information performs restoration from coding and compression, and a picture signal is taken out from the image output section 20.
[0017] However, when the packet transmitted from the transmit terminal in the accepting-station side cannot receive, it detects in the UDP packet disassembly section 222, and counting of the number of packets which was not able to be received is carried out with a counter 227. Here, the method of detecting that a packet was not able to receive can detect that the packet which was not able to receive when the consecutive number of a packet is given in the header of an UDP packet, this number was checked for every packet reception and the discontinuity of a number has been detected exists. In the transmission control section 226, this counter is monitored continuously, it notifies to the lack information transmitting section 225 by making the value of a counter into the number of lack packets at a certain fixed spacing, and suitable timing sends out lack information to a transmit-terminal side in the lack information transmitting section. On the other hand, in a transmit terminal, if the lack information

transmitted from the accepting station is received in the lack information receive section 125, receiving contents will be notified to the transmission control section 126. Thus, the end of both ends can know lack of a packet. In addition, the notice means of lack information is realizable using a RTP control protocol (RTCP).

[0018] Then, when the threshold of the number of lack of a packet is beforehand determined between mutual terminals,when starting a communication link, and packet lack exceeded the ** value by the accepting-station side, the RTP packet which was put on the TCP packet and came from the transmit terminal is receivable by changing SW228 from the b side to the a side. Henceforth, the RTP packet extracted via SW228 in the packet which received in the packet receive section 221 to the RTP packet disassembly section 224 after removing delivery, a header, etc. to the TCP packet disassembly section 223 is handed over. On the other hand, in a transmit-terminal side, if it recognizes that the packet lack notified from the accepting station exceeded the ** value in the transmission control section 126, SW127 is closed, two kinds of packets, an UDP packet and a TCP packet, will be used, and one RTP packet will be transmitted to an accepting-station side.

[0019] It becomes possible to transmit by this changing the image information which was being transmitted between the transmit terminal and the accepting station using the UDP protocol to a TCP protocol, and positive transmission by the resending function of a TCP protocol is performed. In addition, when the ** value of packet lack is exceeded by the accepting-station side, it is possible this time or subsequent ones and to also make transmission according SW to an UDP protocol continue as with the b side to avoid the fall of the throughput by resending and continue a communication link, even if packet lack etc. occurs. Moreover, the connection diagram in the case of being the conventional-type accepting station 4 with which an accepting-station side cannot change UDP/TCP packet reception shown by this invention is shown in drawing 4 . It is possible to perform transmission which in this connection used the communication link by the UDP protocol since packet lack information was not notified to a transmit terminal 1 from an accepting station 4 even if lack of a packet occurs.

[0020]

[Effect of the Invention] In the communication link which used this invention equipment, a high definition image or voice is receivable in a transmitting list. Moreover, since an UDP packet also transmits an image or speech information, even if a partner is the terminal of international-standards conformity, it can communicate satisfactory.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the multimedia communication equipment which performs packet communication especially using the protocol (TCP (UDP)/IP) of the packet base about the communication link between applications performed with information processors which operate on networks, such aś LAN, such as a personal computer and a Personal Digital Assistant.

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PRIOR ART

[Description of the Prior Art] When performing the communication link based on international-standards ITU-TH.323 when an image, voice, or these broadcasts were conventionally performed using a packet communication line, the communication link which used UDP for the communications protocol RTP (A Transport Protocol for Real-Time Applications) list is performed. Hereafter, the case where picture transmission is performed is explained, referring to drawing 7 .
[0003] First, in a transmit terminal 3, the image transmitted from the image input section 30 is captured. The incorporated picture signal is changed into the information which performed suitable compression, coding, etc. for a communication link in the image coding section 31. This changed information is passed to the transmitting section 32. In the transmitting section 32, first, in order to transmit image information to an accepting station 4 in RTP packet group Tatebe 321 using a RTP protocol, information, such as a header required for image information, is given, and a RTP packet is generated. By UDP packet group Tatebe 322, the generated RTP packet gives information, such as a header, and generates an UDP packet. The generated UDP packet is sent out to the packet communication line 5 from the packet transmitting section 323.
[0004] In an accepting station 4, the packet which reached from the packet communication line 5 is received in a receive section 43. In the receiving department, the packet receive section 433 receives a packet from a communication line first. Next, a RTP packet is extracted for the UDP packet which received in the UDP packet disassembly section 432 from the inside of delivery and an UDP packet. The extracted RTP packet takes out only image information in the RTP packet disassembly section 431. In this information, in the image decryption section 42, restoration from coding and compression is performed and a picture signal is taken out from the image output section 41. As mentioned above, the image information to transmit is put on a RTP packet, a RTP packet is further put on an UDP packet, and transmission on a packet communication line is performed.
[0005] Here, UDP (User Datagram Protocol) is a protocol which is attaching greater importance than to dependability to high-speed transmission. The transmission protocol at the time of transmitting one to n UDP packets to drawing 5 is shown. Like drawing 5 , by UDP, since other processings, such as resending, are not carried out only by sending a packet to a partner terminal, high transmission of a throughput can be performed. However, resending of a packet is not performed even when the packet which transmits is mistaken. Thus, UDP has the advantage that high-speed data can be transmitted, although it is unreliable, and since it is fit for transmission of the data with which real time nature like dynamic-image data is demanded, by the conventional method, UDP is used for the image list by transmission of voice coded data.
[0006] If the consecutive number of a packet is given in the user data area of an UDP packet and the discontinuity of the consecutive number is detected by the accepting-station side in JP,10-56479,A in order to improve the lowness of this dependability, lack information would be notified to the transmit terminal and the approach of requiring resending of a transmit-terminal side will be adopted. By this approach, the higher-level protocol of an UDP protocol needs to mount the original protocol indicated by this official report, and needs to realize this.

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EFFECT OF THE INVENTION

[Effect of the Invention] In the communication link which used this invention equipment, a high definition image or voice is receivable in a transmitting list. Moreover, since an UDP packet also transmits an image or speech information, even if a partner is the terminal of international-standards conformity, it can communicate satisfactory.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] On a packet communication line, lack of a packet arises in the congestion within a circuit, and the wireless section in a circuit owing to generating of a transmission error etc. In a Prior art, voice is formed into an UDP packet in an image list, and it transmits against this. UDP is "a communications protocol without ********" which does not secure about a communication link and is said commonly as aforementioned. It is unrealizable even if there is a request [user] of "wanting to transmit an image correctly since transmission may take time amount somewhat" in the environment which a packet loses. Moreover, when performing the image or voice communication to which the implementation approach in the above-mentioned official report was also usually based on ITU-T recommendation H.323, the RTP protocol is used for the higher-level protocol of an UDP protocol, and if the protocol shown in this official report instead of the RTP protocol is adopted, connection mutual between each terminal is no longer secured.

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MEANS

[Means for Solving the Problem] By this invention, in order to solve the above-mentioned technical problem, when packet lack occurs, from a transmitting side, transmission with a reliable TCP protocol is performed in parallel to transmission with an UDP protocol, and an image or voice is transmitted. At a receiving side, it receives by either UDP or TCP. TCP (Transmission Control Protocol) is a protocol which enables a reliable communication link here, and whenever a receiving side receives a packet, it returns ACK to a transmitting side, by the transmitting side, it waits to send ACK and transmits the following packet. When an error is in a receive packet by the receiving side temporarily, NACK is returned and resending is performed. The transmission protocol at the time of transmitting one to n TCP packets to drawing 6 is shown. Like drawing 6 , by TCP, although transmission of data is secured, since a procedure more nearly required for transmission of data than UDP becomes complicated, it becomes comparatively unsuitable for transmission of the data with which real time nature is demanded. Moreover, the function which supervises packet lack of an UDP protocol is given, and it enables it to transmit lack information to a transmitting side in a receiving side. Furthermore, it enables it for a transmitting side to choose the information transmitted to coincidence with two protocols, and to receive by enabling it to receive an image or speech information, with an UDP protocol or a TCP protocol.
[0009] In the multimedia communication equipment with which invention of claim 1 performs a packet base communication link for multimedia information, such as image information or speech information A means to create a RTP packet as a function transmitted to a partner terminal, A means to create an UDP packet from a RTP packet, and a means to create a TCP packet from a RTP packet, A means to send out an UDP packet or a TCP packet to a communication line, As a function which has a means to receive the packet lack information which comes from a partner terminal, and is received from a partner terminal A means to receive the UDP packet or TCP packet sent from the partner terminal from a packet communication line, A means to extract a RTP packet from an UDP packet, and a means to extract a RTP packet from a TCP packet, A means to extract multimedia information from said extracted RTP packet, It has the means which carries out counting of the number of lack of an UDP packet, and a means to transmit to a partner terminal by making into packet lack information the number of lack of the UDP packet by which counting was carried out, and multimedia information is made to communicate mutually through a packet communication line.
[0010] Invention of claim 2 is made to perform transmission by the TCP packet using the packet lack information which came from the partner terminal in parallel to transmission of the multimedia information by the UDP packet in invention of claim 1.
[0011] In invention of claims 1 or 2, invention of claim 3 establishes a means to choose either among the UDP packet which put multimedia information, such as the same image information or speech information, from the partner terminal, or a TCP packet, and to receive, determines the packet which receives from packet lack information, and receives multimedia information.
[0012] Invention of claim 4 relates to the record medium which can be read by computer which recorded the program for operating a computer as multimedia communication equipment according to claim 1 to 3.

[0013]
[Embodiment of the Invention] Since it becomes possible to receive the same data by the receiving side according to the multimedia communication equipment of this invention, when the image or speech information carried with the TCP protocol to receive an image or speech information correctly is received and lack of a packet occurs, it enables an accepting-station side to receive an image or speech information certainly with a resending means. Moreover, since the transmitting side has transmitted an image or speech information by both UDP/TCP, the image to the terminal based on ITU-TH.323 or transmission of speech information can also secure interconnectivity that what is necessary is just to receive the information carried with the UDP protocol.
[0014] The configuration of the example of this invention is explained. Drawing 1 is drawing showing the communication link topology of one example of this invention. Drawing 2 is the block block diagram of one example of the transmitting section in a transmit terminal of this invention. Drawing 3 is the block block diagram of one example of the receive section in an accepting station of this invention. The example of this invention shows the case where the image inputted from the transmit terminal 1 is transmitted to an accepting station 2 via the packet communication line 5. Actuation of the example of this invention is explained below.
[0015] First, the image transmitted from the image input section 10 is captured. The incorporated picture signal is changed into the information which performed compression, coding, etc. suitable in the image coding section 11, for a communication link. This changed information is passed to the transmitting section 12. In the transmitting section 12, in order to use a RTP protocol and to transmit image information to an accepting-station side in RTP packet group Tatebe 121 first, information, such as a header required for image information, is given, and a RTP packet is generated. By UDP packet group Tatebe 122, the generated RTP packet gives information, such as a header, and generates an UDP packet. The generated UDP packet is sent out to a packet communication line from the packet transmitting section 124.
[0016] In an accepting station 2, the packet which reached from the packet communication line 5 is received in a receive section 22. In a receive section 22, the packet receive section 221 receives a packet from a communication line first. Next, a RTP packet is extracted for the UDP packet which received in the UDP packet disassembly section 222 from the inside of delivery and an UDP packet. The extracted RTP packet takes out only image information in the RTP packet disassembly section 224. In addition, since image information is transmitted by the UDP packet at the time of communication link initiation, SW228 has been moved to the b position. In the image decryption section 21, the taken-out information performs restoration from coding and compression, and a picture signal is taken out from the image output section 20.
[0017] However, when the packet transmitted from the transmit terminal in the accepting-station side cannot receive, it detects in the UDP packet disassembly section 222, and counting of the number of packets which was not able to be received is carried out with a counter 227. Here, the method of detecting that a packet was not able to receive can detect that the packet which was not able to receive when the consecutive number of a packet is given in the header of an UDP packet, this number was checked for every packet reception and the discontinuity of a number has been detected exists. In the transmission control section 226, this counter is monitored continuously, it notifies to the lack information transmitting section 225 by making the value of a counter into the number of lack packets at a certain fixed spacing, and suitable timing sends out lack information to a transmit-terminal side in the lack information transmitting section. On the other hand, in a transmit terminal, if the lack information transmitted from the accepting station is received in the lack information receive section 125, receiving contents will be notified to the transmission control section 126. Thus, the end of both ends can know lack of a packet. In addition, the notice means of lack information is realizable using a RTP control protocol (RTCP).
[0018] Then, when the threshold of the number of lack of a packet is beforehand determined between mutual terminals when starting a communication link, and packet lack exceeded the ** value by the accepting-station side, the RTP packet which was put on the TCP packet and came from the transmit

terminal is receivable by changing SW228 from the b side to the a side. Henceforth, the RTP packet extracted via SW228 in the packet which received in the packet receive section 221 to the RTP packet disassembly section 224 after removing delivery, a header, etc. to the TCP packet disassembly section 223 is handed over. On the other hand, in a transmit-terminal side, if it recognizes that the packet lack notified from the accepting station exceeded the ** value in the transmission control section 126, SW127 is closed, two kinds of packets, an UDP packet and a TCP packet, will be used, and one RTP packet will be transmitted to an accepting-station side.

[0019] It becomes possible to transmit by this changing the image information which was being transmitted between the transmit terminal and the accepting station using the UDP protocol to a TCP protocol, and positive transmission by the resending function of a TCP protocol is performed. In addition, when the ** value of packet lack is exceeded by the accepting-station side, it is possible this time or subsequent ones and to also make transmission according SW to an UDP protocol continue as with the b side to avoid the fall of the throughput by resending and continue a communication link, even if packet lack etc. occurs. Moreover, the connection diagram in the case of being the conventional-type accepting station 4 with which an accepting-station side cannot change UDP/TCP packet reception shown by this invention is shown in drawing 4 . It is possible to perform transmission which in this connection used the communication link by the UDP protocol since packet lack information was not notified to a transmit terminal 1 from an accepting station 4 even if lack of a packet occurs.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is a block diagram showing the communication link topology of one example of this invention.
[Drawing 2] It is a block block diagram showing one example of the transmitting section of this invention.
[Drawing 3] It is a block block diagram showing one example of the receive section of this invention.
[Drawing 4] It is a block block diagram showing a communication link topology with the conventional-type accepting station which are other examples of this invention.
[Drawing 5] It is a sequence diagram showing the communication link between terminals using UDP.
[Drawing 6] It is a sequence diagram showing the communication link between terminals using TCP.
[Drawing 7] It is a block diagram showing the pictorial communication by the conventional packet.
[Description of Notations]
1 [-- Conventional-type accepting station,] -- A transmit terminal, 2 -- An accepting station, 3 -- A conventional-type transmit terminal, 4 5 [-- Transmitting section,] -- A packet communication line, 10 -- The image input section, 11 -- The image coding section, 12 20 [-- Image input section,] -- The image output section, 21 -- The image decryption section, 22 -- A receive section, 30 31 [-- Image decryption section,] -- The image coding section, 32 -- The transmitting section, 41 -- The image output section, 42 43 -- A receive section, 121 -- RTP packet group Tatebe, 122 -- UDP packet group Tatebe, 123 -- TCP packet group Tatebe, 124 -- The packet transmitting section, 125 -- Lack information receive section, 126 [-- UDP packet disassembly section,] -- The transmission control section, 127 -- SW, 221 -- A packet receive section, 222 223 -- The TCP packet disassembly section, 224 -- The RTP packet disassembly section, 225 -- Lack information transmitting section, 226 [-- RTP packet group Tatebe, 322 / -- UDP packet group Tatebe, 323 / -- The packet transmitting section, 431 / -- The RTP packet disassembly section, 432 / -- The UDP packet disassembly section, 433 / -- Packet receive section.] -- The transmission control section, 227 -- A counter, 228 -- SW, 321

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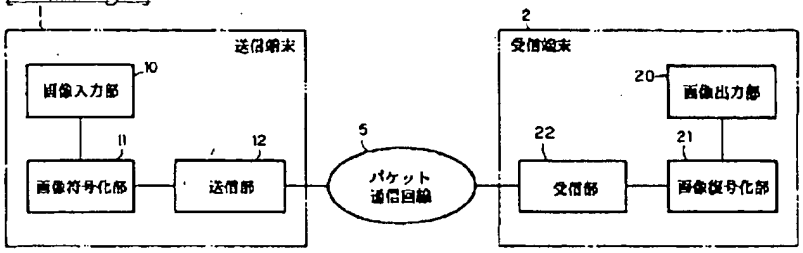
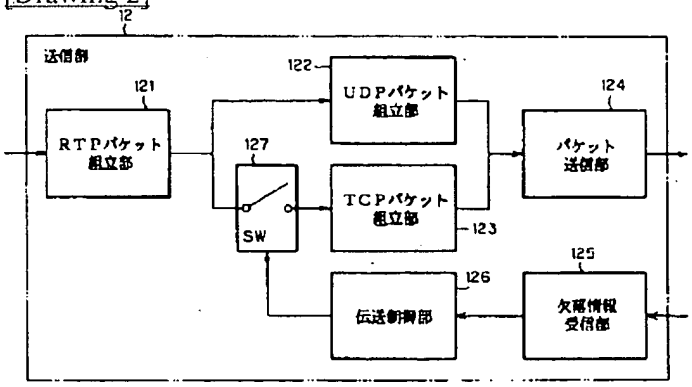
DRAWINGS

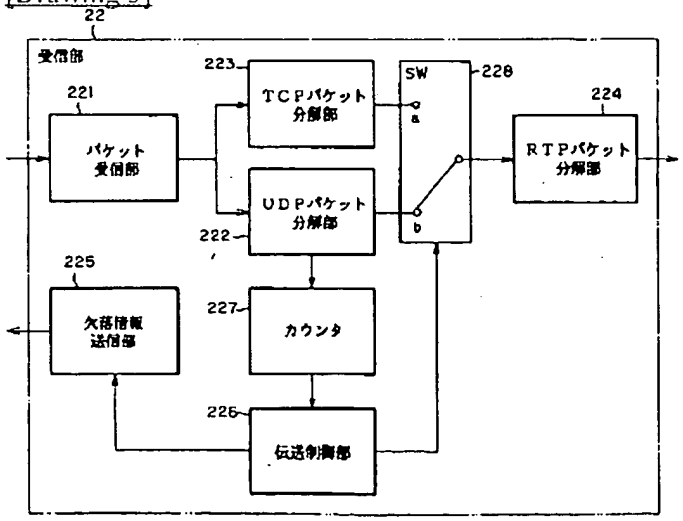
[Drawing 1]



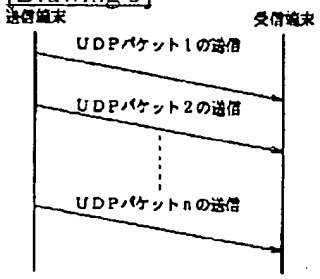
[Drawing 2]



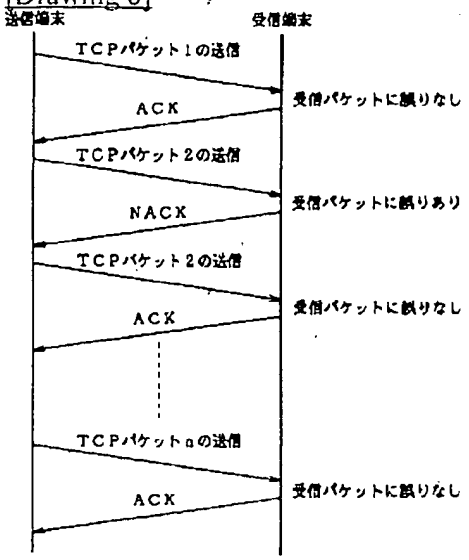
[Drawing 3]



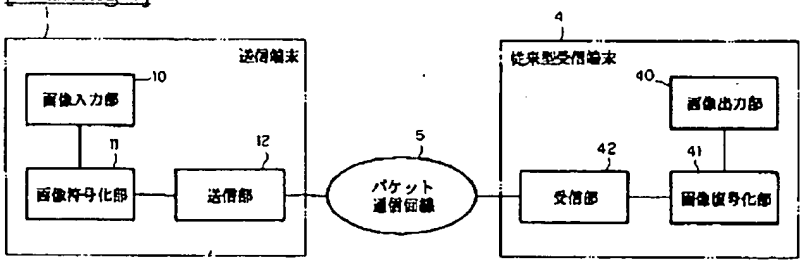
[Drawing 5]



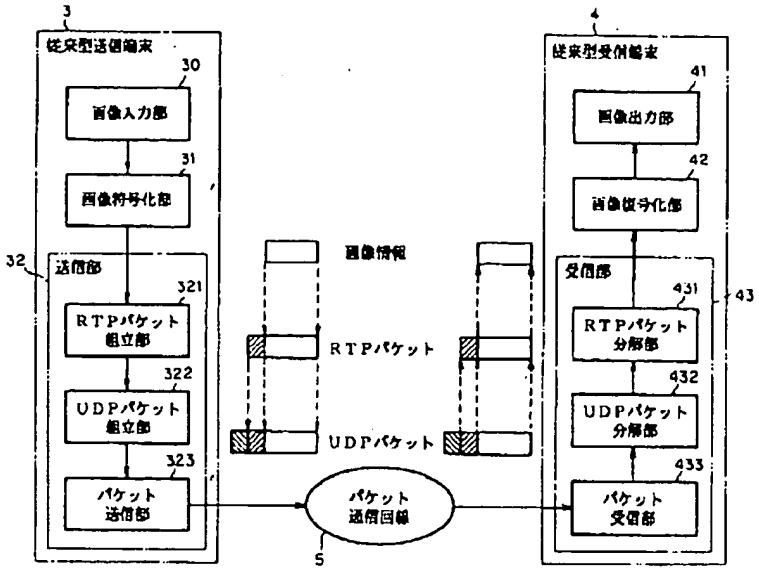
[Drawing 6]



[Drawing 4]



[Drawing 7]



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